

# **Protected Bikeway Update to the Minneapolis Bicycle Master Plan**

**DRAFT**

**April 17, 2015**



**What is a protected bikeway?**

A protected bikeway is a bicycle facility that is physically separated from motor vehicle traffic. Off-street trails are the most common type of protected bikeway; however, protected bikeways may also be located within street corridors and separated from traffic lanes through parked cars, curbs, medians, bollards/flexible traffic posts, planters or other vertical feature. Protected bikeways are not the only tool in Minneapolis’ bikeway toolbox. Other bikeway facility types include bike lanes, shared lanes and bike boulevards.

**Why do we need protected bikeways?**

Minneapolis is a great city for bicycling. The bicycle network has been expanded significantly in recent years, and a lot of people are biking. However, not everyone feels comfortable and safe riding on a busy street, even with a bike lane. There are some parts of the city where potential bicycling demand is high, but where low-stress bikeway facilities such as trails, bike boulevards, and lower-traffic streets are not an option. To continue to grow bicycling in Minneapolis, we need to make more of the city easier to bike for more people.

**Why do we need to update the plan?**

The current Minneapolis Bicycle Master Plan, adopted in 2011, addresses a broad range of bikeway facility types, including off-street trails, bike boulevards, bike lanes, and shared lanes, but it does not specifically address on-street protected bikeways. The City of Minneapolis also approved a Climate Action Plan in 2013 recommending implementation of 30 miles of on-street protected bike facilities by 2020.

**What is the scope of the plan update?**

This plan update identifies priority locations for near-term implementation of protected bikeways in Minneapolis. The plan update focuses on near-term priorities, not a long-term vision, for protected bikeways. The majority of recommended protected bikeways are located in downtown or connecting to downtown where bicycle demand is high and there are few low-stress bikeway options, such as trails, bike boulevards, or quiet residential streets. This plan update does not address non-protected bikeways in the existing 2011 Bicycle Master Plan.



Credit: People for Bikes

Protected bikeways can extend the experience of biking on a trail to busy city destinations where low-stress bikeway options like trails, bike boulevards, or low-traffic streets aren’t an option.

**Minneapolis Bikeway Network Development**

Bikeway Type	Centerline Miles by Year				
	1997	2010	2014	This Plan	Long-Term*
Protected Bikeways	62	89	96	144	174
Bike Lanes	19	44	82	50	104
Shared Lanes	1	5	15	11	74
Bike Boulevards			20	20	44
To Be Determined				6	6
<b>Total</b>	<b>82</b>	<b>138</b>	<b>213</b>	<b>232</b>	<b>403</b>

\* Based on existing network, this plan, 2011 Bicycle Master Plan, and other recent planning activities.

**Minneapolis Bikeway Facility Types**

**Protected Bikeways**

- Off-Street Trail
- Bike/Pedestrian Bridge
- Street Sidewalk
- Protected Bike Lane

**Bike Lanes**

- Bike Lane
- Buffered Bike Lane
- Contraflow Bike Lane
- Advisory Bike Lane
- Shoulder Accommodation

**Bike Boulevards**

**Shared Lanes**

- Shared Use Lane Markings (Sharrows)
- Signed Bike Route
- Shared Bike/Bus Lane

Protected bikeways are one of four categories of bikeways used in Minneapolis.

**Examples of Protected Bikeways**

Protected bikeways may be one-way or two-way facilities. In street corridors, they may be at street-level (inside the curb) or at sidewalk level (behind the curb). Here are a few examples of protected bikeways in Minneapolis and other cities.



*Midtown Greenway, Minneapolis*



*Loring Bikeway, Minneapolis*



*Plymouth Avenue Bridge over the Mississippi River, Minneapolis*



*New York City*

Credit: The Green Lane Project



*Vancouver*



*Chicago*

Credit: Chicago Tribune

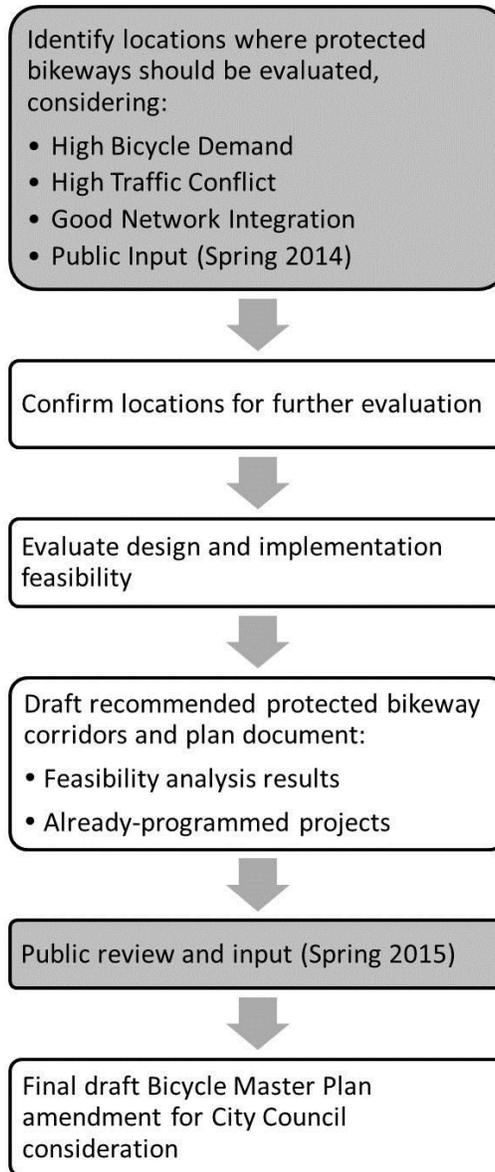
**Evaluation and Engagement Process**

The draft plan update is the result of a year-long planning process, beginning with a public open house and online survey in spring 2014 that sought input on locations where protected bikeways are most needed.

City staff used the public input to identify locations where protected bikeways should be evaluated, while also considering areas with high bicycle demand, high traffic conflict and good network integration. Staff worked with the Bicycle Advisory Committee to identify 19 corridors for further evaluation.

17 of the identified 19 corridors were further evaluated by a team of Minneapolis Public Works and Hennepin County staff. The feasibility of implementing protected bikeways was difficult to determine in some segments due to challenging tradeoffs with existing curb-side uses. This includes significant portions of two downtown corridors (Hennepin Ave S/1st Ave N and 5th/6th Streets S); these segments are identified as bikeway facility type “to be determined.” The appendix contains the results of this feasibility analysis, including a preliminary design concept for each corridor. The appendix also includes cost estimates based on a protected bikeway design with flexible delineator posts. Costs could be higher based on different design scenarios.

The recommended near-term protected bikeway projects in this plan update include the results of this planning process as well as protected bikeways that were already programmed for implementation in 2015 or later.



Coordination with Minneapolis Bicycle Advisory Committee and Hennepin County

Similar to the current Minneapolis Bicycle Master Plan, it is important to note that this plan update is guidance for the design process. Community input and technical factors may result in a different design. As opportunities to implement protected bikeways arise, engagement plans will be developed for each project based on the context of the corridor, including type of opportunity (e.g. street resurfacing, street reconstruction), level of technical challenges and the range of stakeholders.

The draft plan was reviewed by the Bicycle Advisory Committee, as well as staff from Hennepin County, MnDOT, MPRB, and Metro Transit prior to being released for public review and comment in spring 2015.

## Priority Near-Term Protected Bikeway Projects

Tables 1-3 and Figures 1-4 show the corridors recommended for near-term protected bikeway implementation with the intent of meeting or exceeding the Climate Action Plan's goal of 30 miles of on-street protected bicycle facilities by 2020. These corridors total more than 50 miles, including over 30 miles on corridors where there is an existing bicycle facility. A significant focus of this plan update is to upgrade the quality of existing bicycle facilities in busy traffic corridors where there alternative low-stress routes are limited.

The costs shown are high-level estimates and will require further refinement. The low end of the cost range represents the estimated cost of removal and installation of all pavement markings, signs, delineators, traffic control, mobilization and construction elements, while the high end of the cost range represents estimated additional costs of traffic signals and pavement seal coating, which may not be necessary for all projects; both figures include a 25% contingency. Cost estimates for projects that are already funded are not included.

An approximate phasing is shown in three tiers relative to the complexity of project delivery, funding opportunities, and coordination with other infrastructure projects. This phasing is intended to be flexible and used as an implementation guide, not a strict program of projects.

- Tier 1 includes 15 miles of corridors, including 7 miles with no existing bicycle facility. These projects are the nearest-term opportunities for implementation of protected bikeways, and many are already funded. Between \$3.0 million and \$4.3 million in additional funds will be needed to implement these projects, excluding projects that are already funded. See Table 1 and Figure 1.
- Tier 2 includes 28 miles of corridors, including 9 miles with no existing bicycle facility. These projects are either more complex to implement or have funding identified in later years than the Tier 1 projects. Between \$4.2 million and \$7.8 million in additional funds will be needed to implement these projects, excluding projects that are already funded. See Table 2 and Figure 2.
- Tier 3 includes 11 miles of corridors, primarily with existing bicycle facilities. These projects are either lower priority or require further evaluation to determine feasibility. See Table 3 and Figure 3.

In addition to these corridors, several corridors were evaluated for protected bikeway feasibility and are recommended for shared lanes, standard bike lanes or buffered bike lanes, instead of protected bike lanes. See Table 4 and Figure 5.

The existing network, recommended protected bikeway projects, existing with recommended protected bikeway projects, and long-term network maps are shown in Figures 6-8.

### Minneapolis Bikeway Network Development – Centerline Miles

Bikeway Type	Network Development to Date			Existing Network with Protected Bikeways in this Plan (Tables 1-3)			Long-Term Network*
	1997	2010	2014	Tier 1	Tier 2	Tier 3	
■ Protected Bikeways	62	89	96	111	136	144	174
■ Bike Lanes	19	44	82	76	59	50	104
■ Shared Lanes	1	5	15	13	13	13	74
■ Bike Boulevards			20	20	20	20	44
■ To Be Determined					2	6	6
<b>Total</b>	<b>82</b>	<b>138</b>	<b>213</b>	<b>220</b>	<b>230</b>	<b>232</b>	<b>403</b>

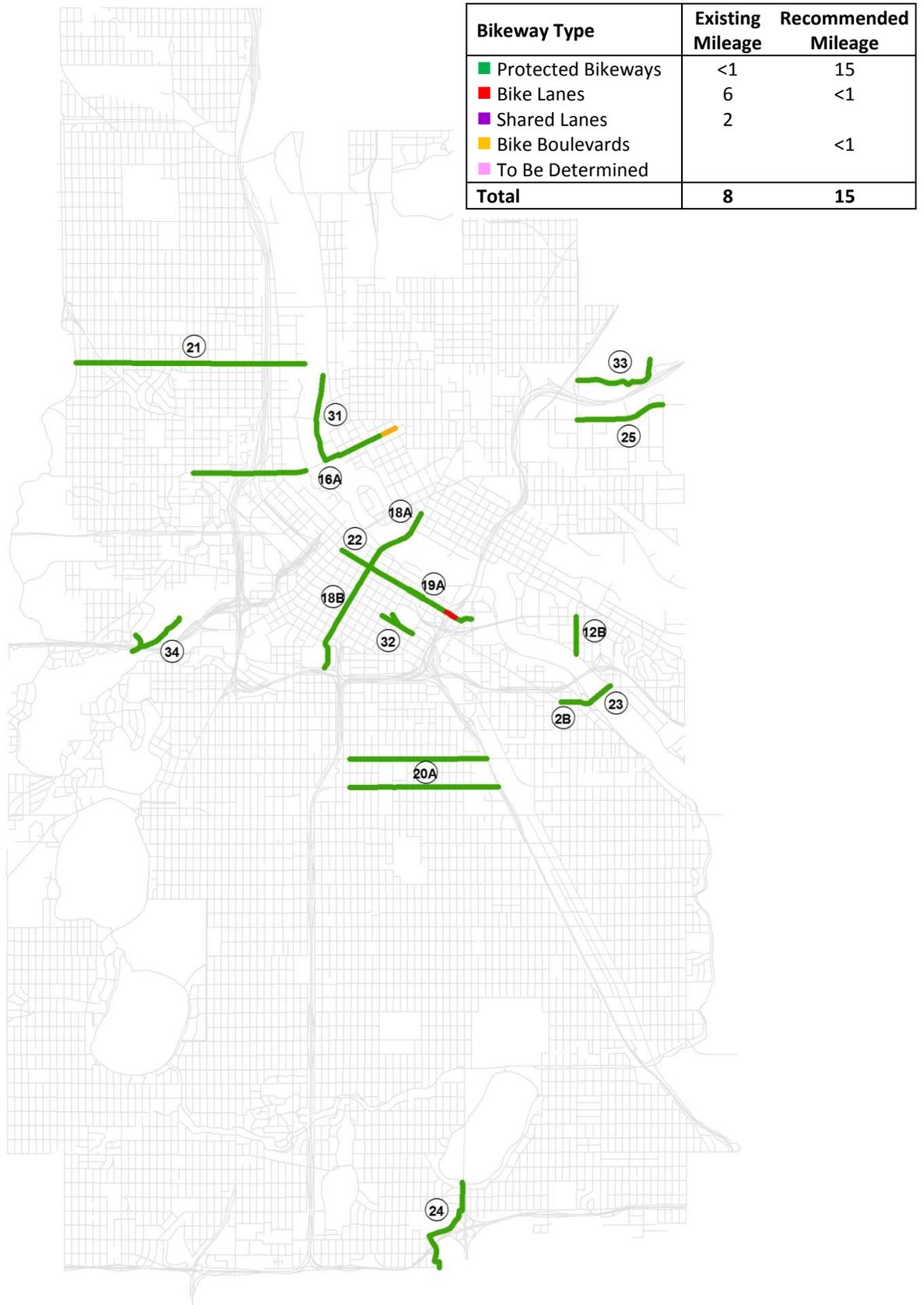
\* Based on the existing network, Tables 1-4 in this plan update, the 2011 Bicycle Master Plan, and other recent planning activities.

**Table 1: Tier 1 Protected Bikeway Implementation Opportunities**

ID	Location	Mileage & Directions	Estimated Unfunded Cost in \$1000s*	Implementation Considerations
2B	Franklin (29 <sup>th</sup> Ave S to Seabury Ave S)	0.3 (2-way)	\$110-185	Resurfaced in 2011; coordinate with #23 river bridge and future 29 <sup>th</sup> Ave bike boulevard
11B	10 <sup>th</sup> St S (1 <sup>st</sup> Ave N to Park Ave S)	0.8 (1-way)	\$195-420	Coordinate with #11C; seal coated in 2012/13
11C	9 <sup>th</sup> St S (1 <sup>st</sup> Av N to Park Ave S)	0.9 (1-way)	\$145-350	2015 resurfacing project (City)
12B	Oak St SE (E River Pkwy to Washington Ave SE)	0.3 (2-way)	\$45-110	Seal coated in 2014
16A	Plymouth Ave N / 8 <sup>th</sup> St NE (Fremont to 5 <sup>th</sup> St NE)	1.9 (2-way)	\$320-570	5-block segment west of Lyndale Ave to be resurfaced in 2018; small segment of bike blvd on eastern end
18A	3 <sup>rd</sup> Ave S (Washington Ave to University Ave SE)	0.7 (2-way)	\$200-375	Coordinate with #18B 3 <sup>rd</sup> Ave S and MnDOT bridge rehabilitation (2020-2021)
18B	3 <sup>rd</sup> Ave S (16 <sup>th</sup> St E to Washington Ave S)	1.0 (2-way)	\$1,580	Requires removal of center medians and left turn lanes; 2016 seal coating candidate
19A	Washington Ave (5 <sup>th</sup> Ave S to 19 <sup>th</sup> Ave S)	0.9 (2-way)	\$245-525	Coordinate with #22 Washington reconstruction/cycletrack; a bike lane is currently proposed for 2015 installation; protected bikeway not feasible on I-35W bridge without widening
20A	26 <sup>th</sup> & 28 <sup>th</sup> St (Portland to Hiawatha)	2.5 (1-way)	partially funded (\$160 needed)	2015 resurfacing project (City)
21	26 <sup>th</sup> Ave N (Wirth Pkwy to River)	2.0 (2-way)	funded	2015-16 project (City)
22	Washington Ave S (Hennepin to 5 <sup>th</sup> Av S)	0.4 (2-way)	funded	2015 project (County)
23	Franklin Ave (river crossing)	0.2 (2-way)	funded	2015 project (County)
24	Intercity Trail	1.0 (2-way)	funded	2015 project (Three Rivers/City/MPRB)
25	Broadway St NE (Stinson Blvd NE to Industrial Blvd NE)	0.8 (2-way)	funded	2015 project; potential 2018-19 reconstruction (federal application submitted)
31	Mississippi River East Bank Trail	0.9 (2-way)	funded	2015 project (Park Board)
32	5 <sup>th</sup> /6 <sup>th</sup> Street Trails (Vikings Stadium)	0.4 (1 & 2-way)	funded	Vikings Stadium project
33	Ridgway Parkway Trail	0.8 (2-way)	funded	2015 project (Park Board)
34	Bryn Mawr Trail	0.7 (2-way)	funded	2015 project (Park Board)
<b>Total Tier 1</b>		<b>16 miles</b>	<b>\$3.0-4.3 million</b>	

Low end of cost range excludes the cost of seal coating and signal improvements, which may not be necessary for all projects.

**Figure 1: Tier 1 Protected Bikeway Implementation Opportunities**

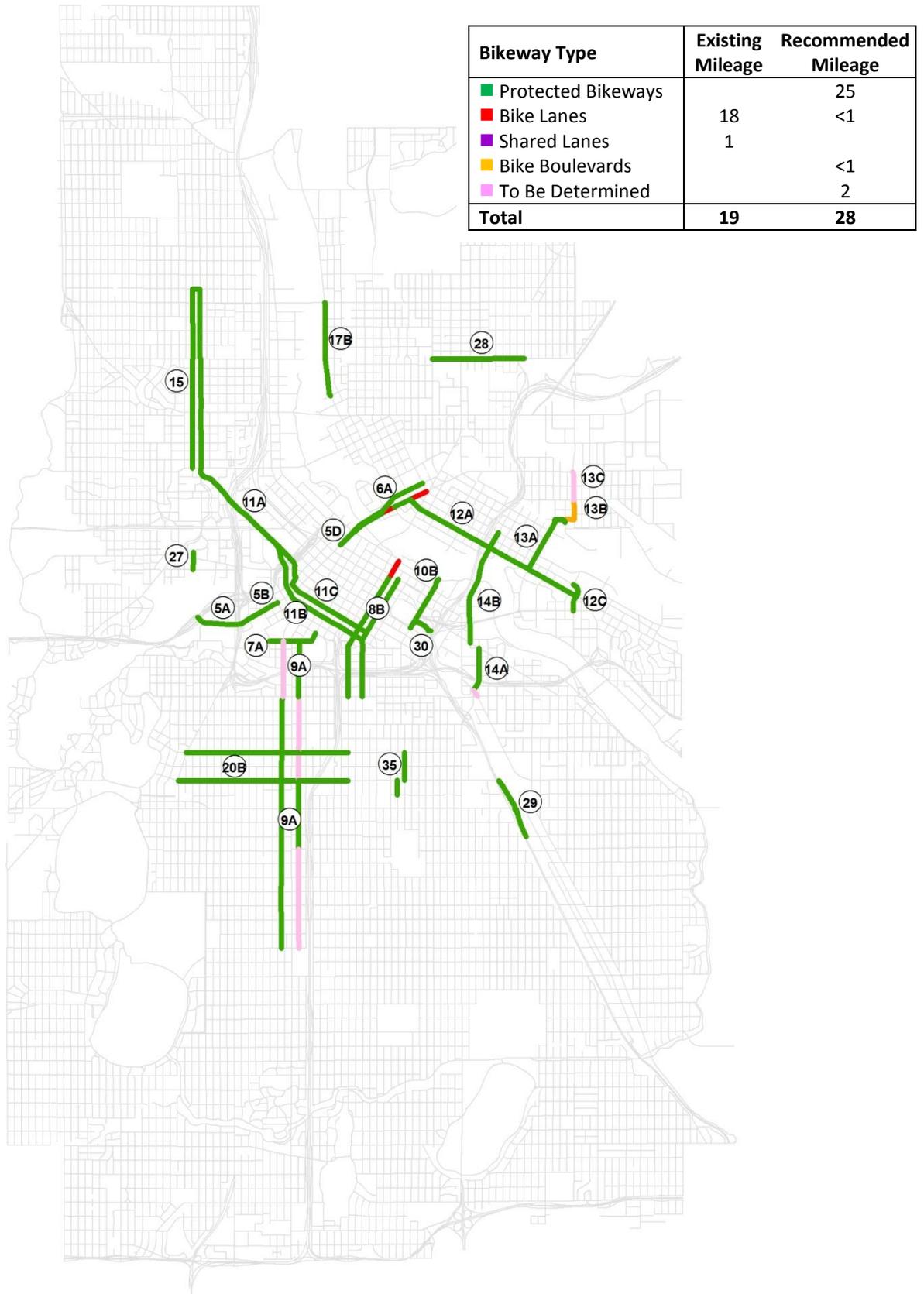


**Table 2: Tier 2 Protected Bikeway Implementation Opportunities**

ID	Location	Mileage & Directions	Estimated Unfunded Cost in \$1000s*	Implementation Considerations
6A/5D	Hennepin/1 <sup>st</sup> Ave NE (Washington Ave to 5 <sup>th</sup> St NE)	1.7 (1 and 2-way)	\$550-740	Coordinate with NE Traffic Study and Nicollet-Central Modern Streetcar
5A	Dunwoody Blvd Trail (Van White Blvd to Hennepin Ave)	0.4 (2-way)	\$310-315	Coordinate with SWLRT sidewalk improvements (2018-2019)
5B	Hennepin Ave (Maple St to 12 <sup>th</sup> St)	0.3 (2-way)	\$20	Coordinate with #5A Dunwoody Blvd Trail
7A	Grant St (Willow St to 2 <sup>nd</sup> Ave S)	0.5 (2-way)	\$90-140	Coordinate with #7B Marquette/2 <sup>nd</sup> & #9A 1 <sup>st</sup> /Blaisdell
8B	Park/Portland (West River Pkwy to Franklin)	2.5 (1-way)	\$365-910	Standard bike lanes north of Washington Ave S
9A	1 <sup>st</sup> /Blaisdell Ave S (Grant St to 40 <sup>th</sup> St)	5.4 (1-way)	\$550-1,400	Several segments need further evaluation to determine whether a protected bikeway is feasible. 1 <sup>st</sup> Ave S (Lake to 12 <sup>th</sup> ) is a 2017 resurfacing project; coordinate with Nicollet-Central Modern Streetcar
10B	11 <sup>th</sup> Ave S (6 <sup>th</sup> St S to West River Pkwy)	0.5 (2-way)	\$95-165	Implement after 5 <sup>th</sup> St I-94 is relocated to 7 <sup>th</sup> St in 2016
11A	7 <sup>th</sup> St N (Plymouth Ave to 1 <sup>st</sup> Ave N)	1.7 (2-way)	funded	SWLRT project (2018-2019)
11B	10 <sup>th</sup> St S (1 <sup>st</sup> Ave N to Park Ave S)	0.8 (1-way)	\$195-420	Coordinate with #11C; seal coated in 2012/13
11C	9 <sup>th</sup> St S (1 <sup>st</sup> Av N to Park Ave S)	0.9 (1-way)	\$145-350	2015 resurfacing project (City)
12A	University Ave SE (1 <sup>st</sup> Ave NE to Oak St SE)	1.8 (2-way)	\$585-920	MnDOT street resurfacing (Central Ave to I-35W) 2018-19
12C	Oak St SE (Washington Ave to Walnut St)	0.3 (2-way)	\$300-375	Complex multimodal intersection
13A-C	15 <sup>th</sup> Ave SE to NE Diagonal (University Ave SE to Hennepin Ave E)	1.1 (2-way)	\$475-665	Potential 2018-19 implementation (federal application submitted "U of M Protected Bikeways"); northern two blocks require further evaluation for a protected bikeway
14 A-B	10 <sup>th</sup> Ave SE/19 <sup>th</sup> Ave SE/20 <sup>th</sup> Ave S (5 <sup>th</sup> St SE to Riverside Ave)	1.5 (2-way)	\$275-490	Potential 2018-19 implementation (federal application submitted "U of M Protected Bikeways"); coordinate with 10 <sup>th</sup> Ave Bridge rehabilitation
15	Emerson/Fremont Ave N (Plymouth to 33 <sup>rd</sup> Ave N) – 1-way on Emerson and Fremont or 2-way on Emerson	3.2 (1-way) or 1.6 (2-way)	\$270-685 (1-way) or \$175-395 (2-way)	Potential 2018-19 implementation (federal application submitted); coordinate with arterial BRT (2018-19) and Emerson Ave resurfacing (Plymouth to West Broadway - 2017)
17B	Marshall St NE (14 <sup>th</sup> to Lowry)	0.8 (2-way)	\$90-215	Coordinate with East Bank Trail projects; cost estimate assumes protected bikeway within existing curb lines; off-street trail would cost more. Evaluate potential extension to 27 <sup>th</sup> Ave NE or St Anthony Pkwy
20B	26 <sup>th</sup> & 28 <sup>th</sup> St (Hennepin to Portland)	2.9 (1-way)	TBD	Coordinate with reconstruction of I-35W bridges (2017-2019)
27	Van White Blvd Trail Gap	0.2 (2-way)	funded	SWLRT project (2018-2019)
28	18 <sup>th</sup> Ave NE (Monroe St NE to Ulysses St NE)	0.8 (2-way)	funded	2018 project (City)
29	Hiawatha Trail Gap	0.6 (2-way)	funded	2018 project (City)
30	5 <sup>th</sup> St S/I-94 Ramp (Hiawatha Trail to 11 <sup>th</sup> Ave S)	0.4 (2-way)	funded	2017-2018 project (City)
35	11 <sup>th</sup> Ave S/12 <sup>th</sup> Ave S (Midtown Greenway to 28 <sup>th</sup> St E)	0.3 (2-way)	funded	2017-2018 Safe Routes to School Project at Andersen School (City)
	<b>Total Tier 2</b>	<b>29 miles</b>	<b>\$4.2-7.8 million</b>	

Low end of cost range excludes the cost of seal coating and signal improvements, which may not be necessary for all projects.

**Figure 2: Tier 2 Protected Bikeway Implementation Opportunities**



**Table 3: Tier 3 Protected Bikeway Implementation Opportunities**

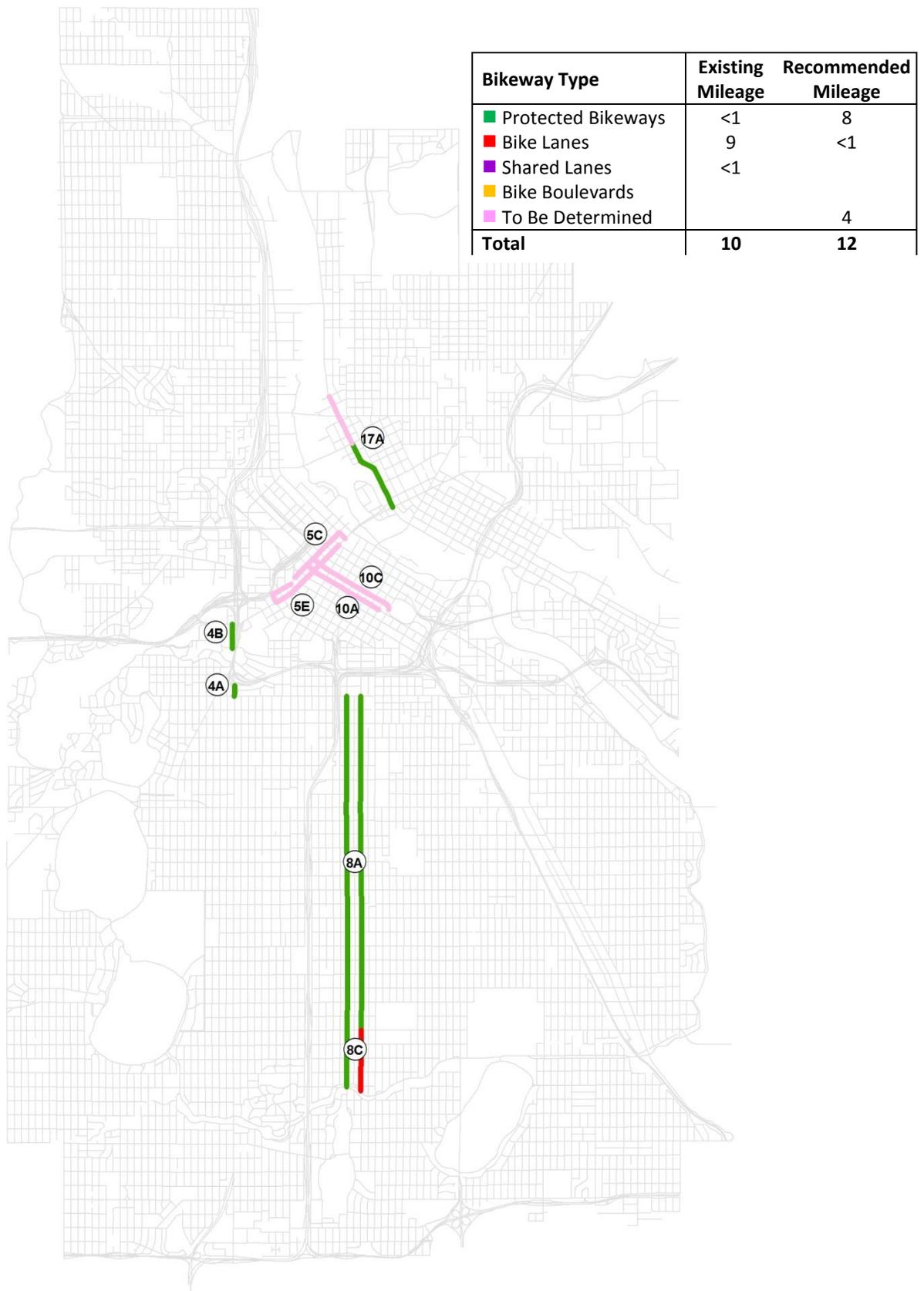
ID	Location	Mileage & Directions	Estimated Unfunded Cost in \$1000s*	Implementation Considerations
4A	Lyndale Ave S (Franklin Ave to Loring Greenway Bridge)	0.1 (2-way)	\$935-1,060	Need to determine logical connection at southern end.
4B	Sculpture Garden Sidepath (Dunwoody to Vineland)	0.2 (2-way)	\$60	Scope of Hennepin/Lyndale project and Sculpture Garden projects (2015-16) do not include installation of a new trail; pinch point at footings of pedestrian bridge.
8A/8C	Park and Portland (Minnehaha Parkway to Franklin)	7.0 (1-way)	\$725-1,845	Buffered bike lanes recently installed. Lower priority than #8B.
17A	Main/Marshall (Hennepin to 14 <sup>th</sup> Ave NE)	1.2 (2-way)	\$165-385	Existing bike lanes; parallel river trail. Lower priority than #17B.
5C or 5E	1 <sup>st</sup> Ave N or Hennepin Ave S (12 <sup>th</sup> to Washington)	0.9 (2-way)	TBD	Existing protected bike lanes on 1 <sup>st</sup> Ave N have lower use than shared bike/traffic lanes on Hennepin Ave S. Further feasibility evaluation needed. Protected bike lanes on Hennepin Ave S would require extensive street reconstruction. Removal of protected bike lanes on 1 <sup>st</sup> Ave N could support future street narrowing and sidewalk widening.
10A & 10C	5 <sup>th</sup> and/or 6 <sup>th</sup> St S (Hennepin to Chicago)	1.6 (1-way)	TBD	Important east-west connection through downtown; further feasibility evaluation needed
	<b>Total Tier 3</b>	<b>11 miles</b>	<b>TBD</b>	

Low end of cost range excludes the cost of seal coating and signal improvements, which may not be necessary for all projects.

**Table 4: Corridors Evaluated and Recommended for Non-Protected Bikeways**

ID	Location	Evaluation Conclusions
1A	24 <sup>th</sup> St (Hennepin Ave to Hiawatha Ave)	Standard bike lanes are feasible and appropriate for the lower-volume traffic conditions on 24th St. Maintain existing bike lanes east of I-35W and add bike lanes west of I-35W (may require parking removal or some shared lane segments).
1B	Franklin Ave (Hennepin Ave to Bloomington Ave)	Protected bike lanes are not feasible. Standard bike lanes are recommended, consistent with the 2011 Bicycle Master Plan. Further evaluation will be needed.
2A	Franklin Ave E (Bloomington to 20 <sup>th</sup> )	A buffered bike lane is recommended. Protected bike lanes are feasible in the existing condition; however, additional parking is planned along the median in conjunction with a pedestrian plaza recently constructed.
2C	Franklin Ave (20 <sup>th</sup> Ave S to 29 <sup>th</sup> Ave S)	Maintain existing bike lanes and on-street parking.
3A	Franklin Ave SE (East River Pkwy to Emerald St SE)	Standard bike lanes are recommended. Street is too narrow for a protected bikeway, even with parking removal.
4C	Hennepin Ave S (Oak Grove to Maple St)	Northbound buffered bike lane will be added in conjunction with 2015-16 Hennepin/Lyndale project. Parallel trail through Loring Park.
6B	5 <sup>th</sup> St NE (Hennepin Ave to 3 <sup>rd</sup> Ave NE)	Maintain/improve existing bike lanes.
7B	Marquette/2 <sup>nd</sup> Ave S (1 <sup>st</sup> Ave S to Washington)	Protected bike lanes are not feasible. Protected bikeway planned for #18B 3 <sup>rd</sup> Ave S, where there is higher bicycle demand and greater network connectivity.
12D	4 <sup>th</sup> St SE (1 <sup>st</sup> Ave NE to Walnut St SE)	Maintain and fill gaps in existing bike lane. Two-way protected bikeway planned for #12A University Ave SE.
13D	15 <sup>th</sup> Ave SE/Como Ave SE (Rollins Ave SE to 18 <sup>th</sup> Ave SE)	Maintain existing bike lanes. Alternative route to #13B.

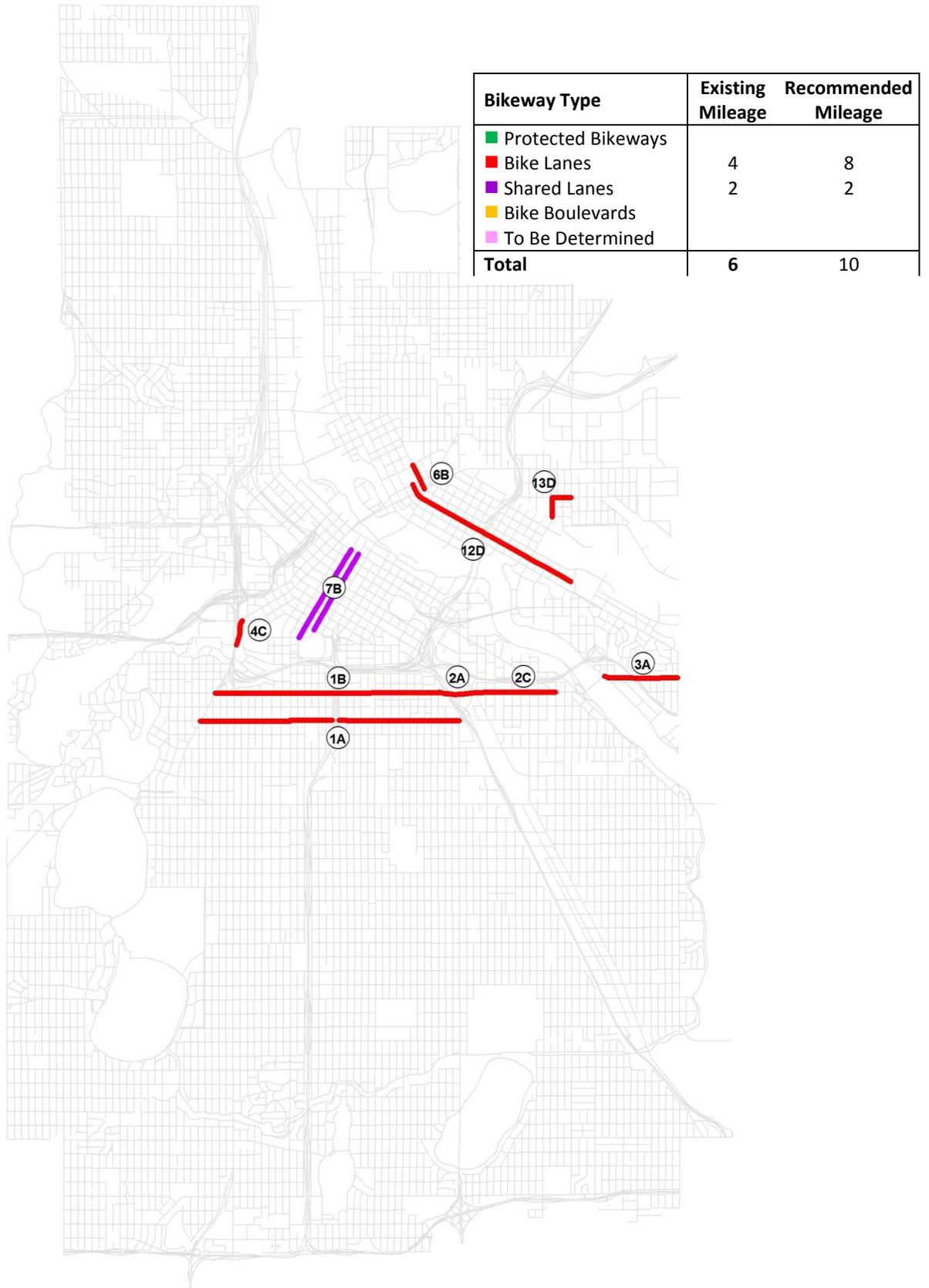
**Figure 3: Tier 3 Protected Bikeway Implementation Opportunities**



**Figure 4: Recommended Near-Term Protected Bikeway Projects (Tiers 1-3)**



**Figure 5: Corridors Evaluated and Recommended for Non-Protected Bikeways**



## Maintenance Considerations

In recent years, the bikeway network has been expanded significantly from 82 miles in 1997 to 213 miles in 2014 with virtually no increase in annual maintenance budgets. In order to successfully implement protected bikeways in Minneapolis, additional maintenance resources will be needed. Not only is the bikeway network mileage recommended for expansion, but protected bikeways cost more to maintain than existing maintenance practices for bike lanes.

Based on the experience of the City of Minneapolis' Transportation Maintenance and Repair Division in maintaining the existing bikeway network, the average costs to maintain different types of bikeways are shown in Table 5, and the estimated maintenance costs of the protected bikeways recommended in this plan are shown in Table 6.

The unit costs for protected bikeways are based on limited experience primarily with the 1st Avenue N protected bike lanes. It is anticipated that as the protected bikeway network grows, there will be economies of scale to be gained; however, these are difficult to forecast with limited experience and are not assumed in these estimates. These estimates do not account for the costs of maintaining the existing system, nor do they account for the incremental change in costs between the existing system, enhanced maintenance of the existing system, and the recommended protected bikeway projects. These are conservative estimates based upon the best information available today and will need to be refined as the City of Minneapolis gains more experience with maintaining protected bikeways.

**Table 5: Average Bikeway Maintenance Unit Costs**

Bikeway Facility Type	Maintenance Practice	Annual Cost per Linear Foot
Trail	Clear Snow & Sweep Weekly	\$2.00/LF
Bike lane with enhanced sweeping (per direction)	Clear Snow & Sweep Weekly	\$1.00/LF
Bike lane with enhanced year-round maintenance (per direction)	Remove Snow & Sweep Weekly	\$3.75/LF
One-way protected bike lane (per direction)	Remove Snow & Sweep Weekly	\$6.50/LF
Two-way protected bike lane on one side	Remove Snow & Sweep Weekly	\$10.00/LF

Source: Minneapolis Public Works Transportation Maintenance and Repair Division

**Table 6: Estimated Annual Maintenance Costs of Plan Recommendations**

Bikeway Facility Type	Cost per Foot	Cost per Mile	Tier 1		Tier 2		Tier 3		Total
			Miles	Cost	Miles	Cost	Miles	Cost	
Trail	\$2.00	\$10,560	6.0	\$64,000	2.7	\$29,000	0.2	\$2,000	\$95,000
One-way protected bike lane (single direction)	\$6.50	\$34,320	2.5	\$86,000	13.7	\$471,000	6.5	\$222,000	\$779,000
One-way protected bike lane (two directions)	\$13.00	\$68,640	4.9	\$335,000	6.7	\$457,000	1.7	\$114,000	\$906,000
Two-way protected bike lane on one side	\$10.00	\$52,800	1.1	\$59,000	4.7	\$247,000	2.8	\$149,000	\$455,000
<b>Total</b>			<b>15</b>	<b>\$544,000</b>	<b>28</b>	<b>\$1,204,000</b>	<b>11</b>	<b>\$487,000</b>	<b>\$2,235,000</b>

This includes all recommended protected bikeways in this plan regardless of ownership (City, County, MnDOT, MPRB) and regardless of existing capital funding status (includes both new and already-funded projects). MPRB trail projects are in Tier 1 and total 3.4 miles and an estimated \$34,000 in annual maintenance costs. For cost estimating purposes, two-way protected bikeways on one side of the street are assumed for Loring Bikeway Southern Extension (4A), Grant St (7A), 5<sup>th</sup> or 6<sup>th</sup> St S (10A & 10C), Oak St SE (12A & 12 B), University Ave SE (12C), 18<sup>th</sup> Ave SE (13C), 10<sup>th</sup>/19<sup>th</sup> Ave SE (14B), Marshall/Main St NE (17A & 17B), and Broadway St NE (25).

Figure 6: Existing Bicycle Network

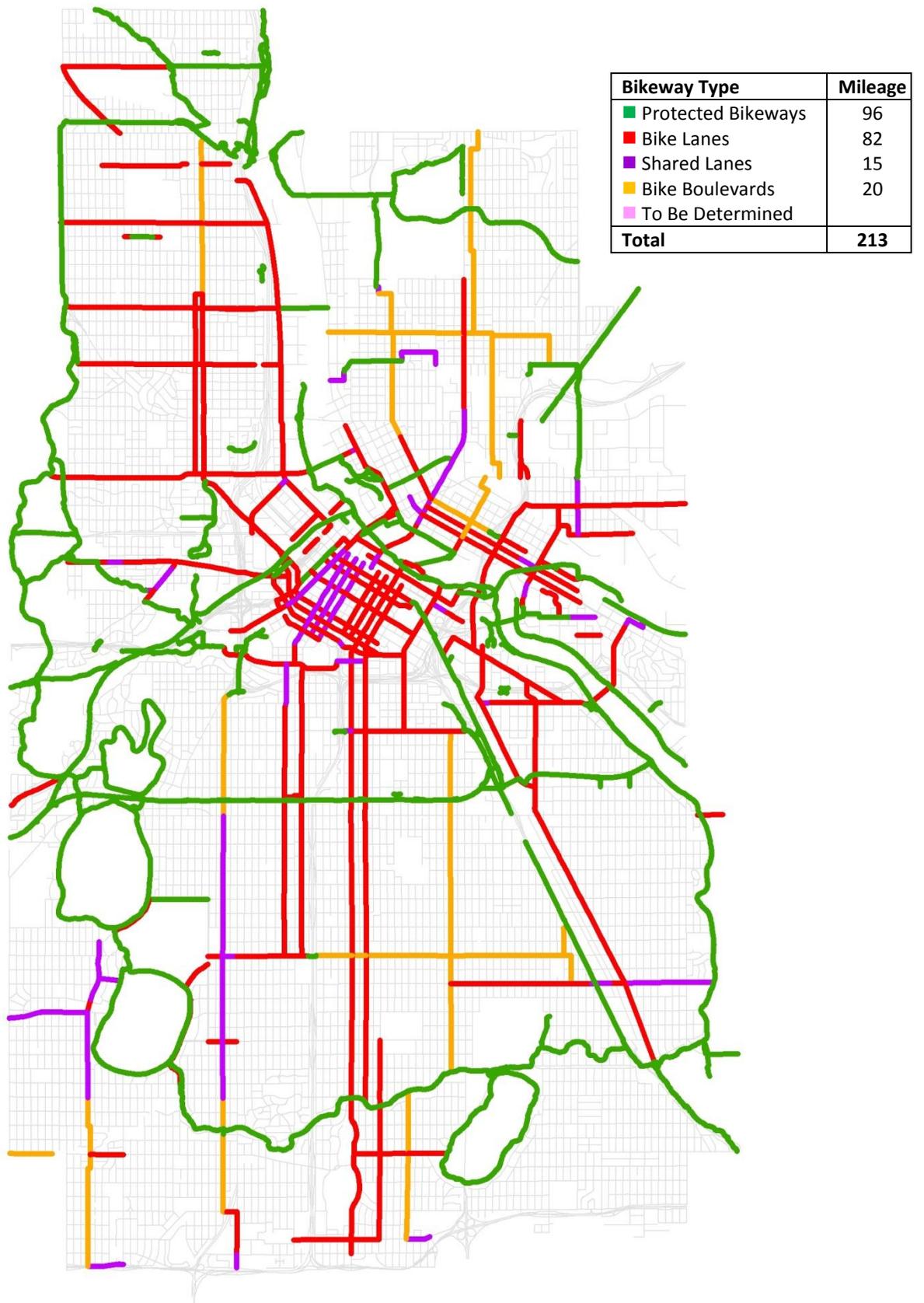
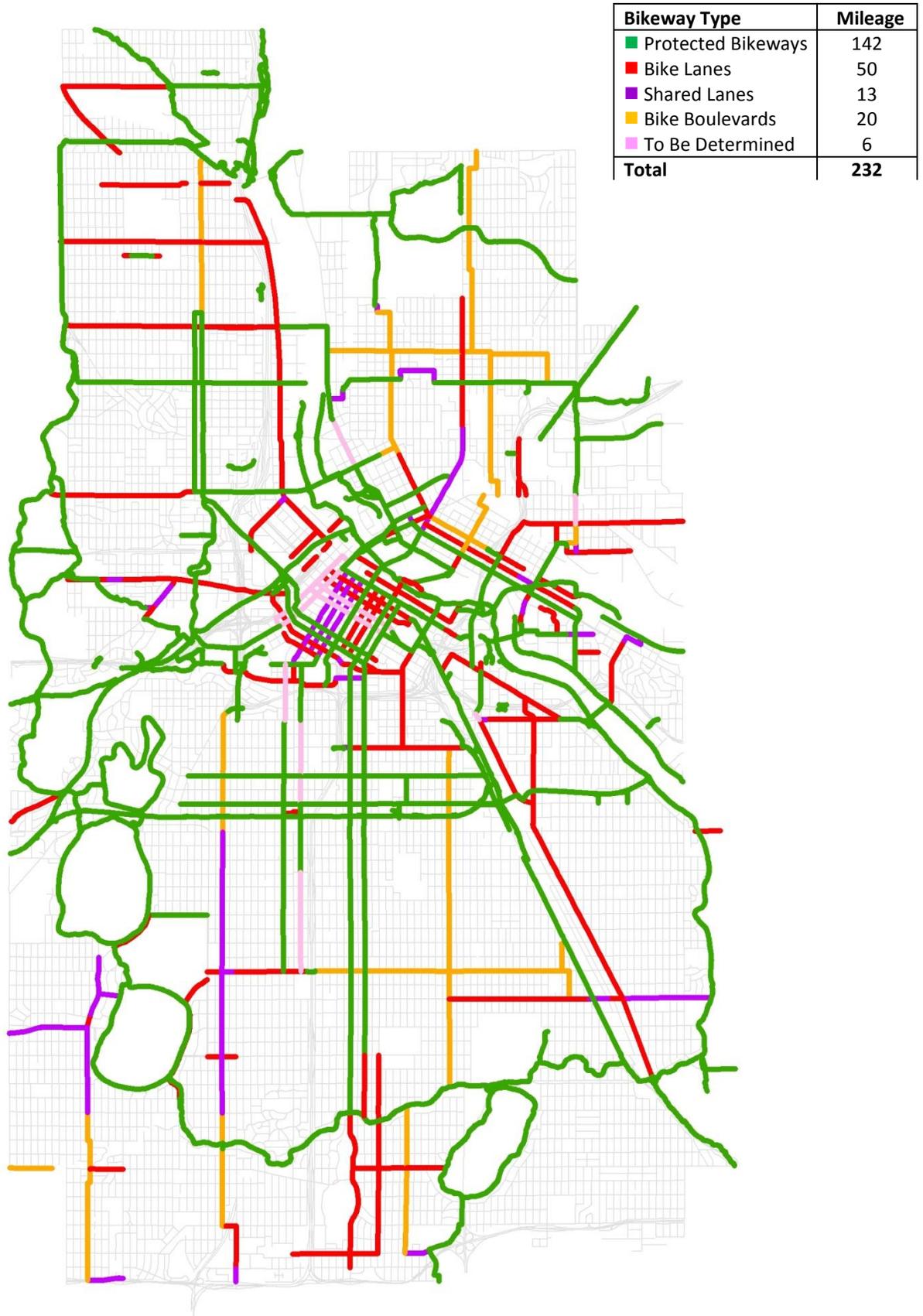


Figure 7: Existing Bicycle Network with Priority Protected Bikeways



**Figure 8: Planned Long-Term Bicycle Network**

Based on the existing network, Tables 1-4 in this plan update, the 2011 Bicycle Master Plan, and other recent planning activities.

